COURSE TITLE : BIOCHEMISTRY

COURSE CODE : BT203

PROJECT TITLE : BIOLOGICAL MOLECULES IN OUR DAILY LIFE

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INTRODUCTION:

Biological molecules, popularly known as biomolecules are the naturally occurring organic molecules which are necessary for our daily life.

They help us in various ways that include growth, reproduction and even provide us energy to perform our day-to-day activities. Biomolecules basically comprise four elements, those are carbon, hydrogen, nitrogen, and oxygen. 4 major biomolecules which are present inside our body as well as are taken and used in our daily life are Carbohydrates, Proteins, Nucleic acids and Lipids. All these biomolecules are non-living molecules which compose a living system. They are having diverse functions in our body from providing and storing energy to hormonal and enzyme activities.

Types of biomolecules and functions :

1)Carbohydrates:

Carbohydrates Organic molecules containing carbon, hydrogen, and oxygen and usually in a 1:2:1 ratio.

They are either simple sugars or sugar polymers; they serve as the primary source of energy for all our daily activities and internal metabolic activities. They are also massively used as dietary fibres.

Examples: glucose, sucrose(disaccharide), starch(polysaccharide)

2)Proteins:

Proteins are complex macromolecules consisting of an arrangement of amino acids in linear sequence, with the peptide bonds bridging between them. The amino acids are molecules centered on a carbon atom, bonded through an amine group, a carboxylic acid group, and one hydrogen; the fourth bond, however, is specific to each type of amino acid.

Protein functions includes structural support for several body parts, catalytic action in biochemical reactions(enzymes), they also plays crucial role in immune system function.

3)Nucleic acids:

Nucleic acids are polymers of nucleotides, where nucleotides are building blocks of genetic information. DNA and RNA are 2 primary types nucleic acids. These are single most important molecules in biotechnology.

Functions of Nucleic acids include: Genetic information storage, protein synthesis and energy transfer.

4)Lipids:

Lipids include molecular subunits similar to those found in fatty acids, and glycerol.

Lipids carry high reservoirs of energy, and of all the animals, triglycerides, one type of lipids serve to be the main energy reserve. They can also convey fat soluble vitamins-A, D, E, K. Phospholipids are major constituents of cell membranes.

5)Enzymes:

Enzymes are the catalyst of biochemical reactions; these are made up of proteins. They decrease the activation energy in chemical reactions that occur in living organisms. They are not used up in reaction hence can be recycled.

Examples: Kinase, Polymerase, Amylase.

6)Vitamins:

Vitamins are organic biomolecules that are required in little amounts for the healthy functioning of human body. They are not produced abundantly in our body and need to be added in the diet in-take.

Their functions include: immune defense, energy metabolism.

EDIBLE PRODUCTS:

There are 5 food products that I have chosen in this assignment.

1.Protein bars

2.Energy drinks

3.Yogurt

4.Instant noodles

1.Protein bars

Fortified protein bars have high proteins combined with vitamins and other beneficial nutrients other than just the proteins.

Common types of Protein Sources Used in Protein Enriched Bars:

Whey Protein: From milk, though very highly used due to its excellent bioavailability and amino acids.

Plant-based proteins: Pea protein, soy protein, rice protein, hemp protein, or any combination of plant-based proteins. Vegetarians and Vegan friendly.

Egg White Protein It has high protein and low in fat and carbohydrates.

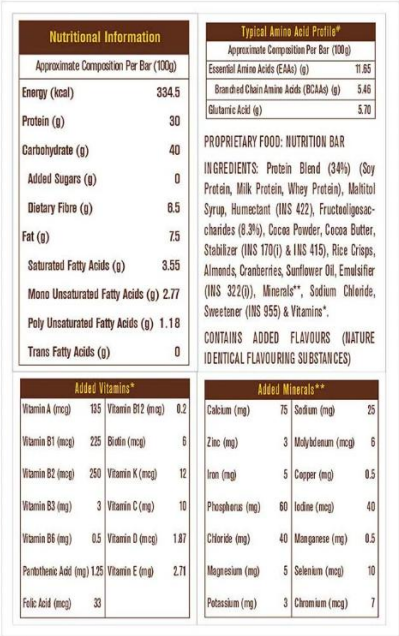
Brands

Muscle Blaze & Fuelled Nutrition

Both these brands produce fortified protein bars and the protein is obtained from different sources like whey protein, Milk, Soya. They also added essential minerals and made sure no trans fats and cholesterols are present

Comparison

Muscle Blaze



Nutritional Information	
Approximate Composition Per Bar (100g)	
Energy (kcal)	334.5
Protein (g)	30
Carbohydrate (g)	40
Added Sugars (g)	0
Dietary Fibre (g)	6.5
Fat (g)	7.5
Saturated Fatty Acids (g)	3.55
Mono Unsaturated Fatty Acids (g)	2.77
Poly Unsaturated Fatty Acids (g)	1.18
Trans Fatty Acids (g)	0

Typical Amino Acid Profile*	
Approximate Composition Per Bar (100 g)	
Essential Amino Acids (EAAs) (g)	11.65
Branched Chain Amino Acids (BCAAs) (g)	5.46
Glutamic Acid (g)	5.70

PROPRIETARY FOOD: NUTRITION BAR

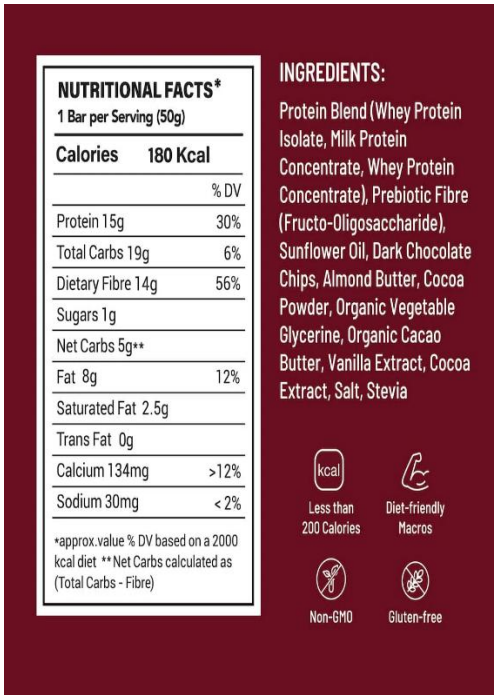
INGREDIENTS: Protein Blend (34%) (Soy Protein, Milk Protein, Whey Protein), Maltitol Syrup, Humectant (INS 422), Fructooligosaccharides (8.3%), Cocoa Powder, Cocoa Butter, Stabilizer (INS 170(i) & INS 415), Rice Crisps, Almonds, Cranberries, Sunflower Oil, Emulsifier (INS 322(i)), Minerals**, Sodium Chloride, Sweetener (INS 955) & Vitamins*.

CONTAINS ADDED FLAVOURS (NATURE IDENTICAL FLAVOURING SUBSTANCES)

Added Vitamins*			
Vitamin A (mcg)	135	Vitamin B12 (mcg)	0.2
Vitamin B1 (mcg)	225	Biotin (mcg)	6
Vitamin B2 (mcg)	250	Vitamin K (mcg)	12
Vitamin B3 (mg)	3	Vitamin C (mg)	10
Vitamin B6 (mg)	0.5	Vitamin D (mcg)	1.87
Pantothenic Acid (mg)	1.25	Vitamin E (mg)	2.71
Folic Acid (mcg)	33		

Added Minerals**			
Calcium (mg)	75	Sodium (mg)	25
Zinc (mg)	3	Molybdenum (mcg)	6
Iron (mg)	5	Copper (mg)	0.5
Phosphorus (mg)	60	Iodine (mcg)	40
Chloride (mg)	40	Manganese (mg)	0.5
Magnesium (mg)	5	Selenium (mcg)	10
Potassium (mg)	3	Chromium (mcg)	7

Fuelled Nutrition



NUTRITIONAL FACTS* 1 Bar per Serving (50g)	
Calories	180 Kcal
	% DV
Protein 15g	30%
Total Carbs 19g	6%
Dietary Fibre 14g	56%
Sugars 1g	
Net Carbs 5g**	
Fat 8g	12%
Saturated Fat 2.5g	
Trans Fat 0g	
Calcium 134mg	>12%
Sodium 30mg	< 2%

*approx.value % DV based on a 2000 kcal diet **Net Carbs calculated as (Total Carbs - Fibre)

INGREDIENTS:

Protein Blend (Whey Protein Isolate, Milk Protein Concentrate, Whey Protein Concentrate), Prebiotic Fibre (Fructo-Oligosaccharide), Sunflower Oil, Dark Chocolate Chips, Almond Butter, Cocoa Powder, Organic Vegetable Glycerine, Organic Cacao Butter, Vanilla Extract, Cocoa Extract, Salt, Stevia

kcal Less than 200 Calories

Diet-friendly Macros

Non-GMO

Gluten-free

Protein Content: Both the bars hold 15g of protein per 50g, but the nutritional density of MuscleBlaze is much higher with added vitamins and minerals.

Calories: Fuelled Nutrition has lesser calories and thus, can be consumed by weight-conscious people.

Fibre: Fuelled Nutrition has a drastic amount of fibre that contributes to smooth digestion and satiety

Fat: Both the bars have almost equal amounts of fat, but Fuelled Nutrition is relatively much more saturated fat.

Ingredients: Fuelled Nutrition uses more natural ingredients than MuscleBlaze, which contains added stabilizers and sweeteners.

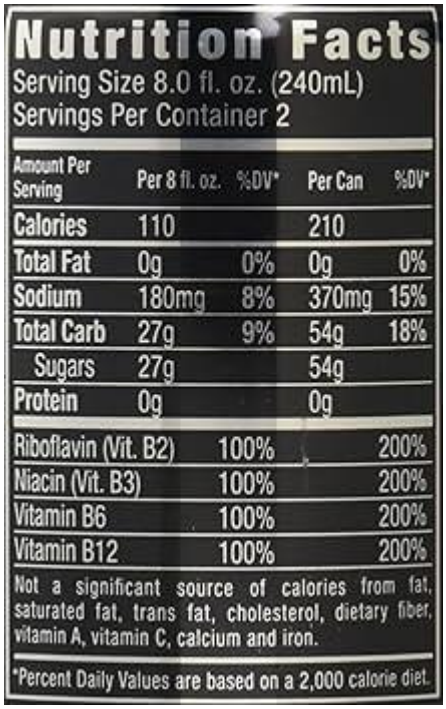
Both bars for different purpose: Fuelled Nutrition is meant for low-calorie, high-fiber diets; MuscleBlaze is better suited to those individuals who look for added vitamins and minerals for overall nutrition.

2.Energy drinks

Energy drinks are beverages that target energizing, stimulating mental alertness, and enhancing physical performance. They are usually bottled with caffeine, sugar, vitamins, and various kinds of stimulants or performance-enhancing ingredients.

Brands

Monster



Nutrition Facts

Serving Size 8.0 fl. oz. (240mL)
Servings Per Container 2

Amount Per Serving	Per 8 fl. oz.	%DV*	Per Can	%DV*
Calories	110		210	
Total Fat	0g	0%	0g	0%
Sodium	180mg	8%	370mg	15%
Total Carb	27g	9%	54g	18%
Sugars	27g		54g	
Protein	0g		0g	
Riboflavin (Vit. B2)		100%		200%
Niacin (Vit. B3)		100%		200%
Vitamin B6		100%		200%
Vitamin B12		100%		200%

Not a significant source of calories from fat, saturated fat, trans fat, cholesterol, dietary fiber, vitamin A, vitamin C, calcium and iron.

*Percent Daily Values are based on a 2,000 calorie diet.

Red Bull

Vitamins:

Vitamin	Monster Energy (Per Serving)	Red Bull (Per Can)
Riboflavin (B2)	100% DV	100% DV
Niacin (B3)	100% DV	100% DV
Vitamin B6	100% DV	250% DV
Vitamin B12	100% DV	80% DV

Both drinks provide 100% DV of B2 and B3. Red Bull offers significantly more Vitamin B6 (250% DV vs. 100%) but less Vitamin B12 (80% DV vs. 100%).

Comparison

Size and Serving: Monster Energy has a larger serving size at 480 mL, so finishing the entire can will therefore double up in calories, carbs, sugars, sodium, and vitamins. The serving size of Red Bull is small at 250 mL, making it difficult to not track how much one consumes.

Sugar Content: Both beverages contain high amounts of sugars, but Monster is able to make it to 54 g per can, whereas Red Bull has a 26 g amount.

Which is better?

If you want a smaller serving size with controlled calorie and sugar intake, then Red Bull would be perfect for you. Monster Energy has more caffeine and vitamins but is much higher in sugar, sodium, and calories, which gives more intense high but will be overwhelming for people who are sensitive to caffeine.

3.Yogurt

Yogurt is a diary product made with fermented milk. It contains many probiotic and beneficial bacteria.

Brands

Amul stirred fruit yoghurt

Nutritional Information		
1 serving per container		
Serving size	100 g	
Amount per pack*		**% RDA#**
Energy (kcal)	133	7%
Total Fat (g)	3.7	6%
Saturated Fat (g)	2.3	10%
Trans Fat (g)	0.0	0%
Cholesterol (mg)	10	
Carbohydrate (g)	18.8	
Total Sugars (g)	17.9	
Added Sugars (g)	12.2	24%
Protein (g)	5.5	
Sodium (mg)	60	3%
Calcium (mg)	160	

*Average values
#RDA stands for Recommended Dietary Allowance per serving

Amul Stirred Fruit Yoghurt - Strawberry

Greek yoghurt

Nutritional Content

Greek Yogurt

Higher protein content (common in Greek yogurt): 6.1 g per 85 g serving.

Lower carbohydrates and sugar content.

Generally thicker and strained, which results in higher protein concentration.

Fewer added ingredients; typically no fruit flavoring unless specified.

Regular Fruit Yogurt (Amul)

Likely lower in protein compared to Greek yogurt.

Typically contains added sugars and fruit puree/flavoring.

Higher carbohydrate content due to added sugars and fruit.

May have more flavor variety due to added fruit and sweeteners.

Greek Yogurt is geared towards health-conscious individuals looking for higher protein and lower sugar content.

Amul Stirred Fruit Yogurt is a good option for those who enjoy a sweeter, flavored snack that's easy to consume.

4.Instant Noodles

Instant noodles are a popular quick meal option that comes with distinct features and nutritional aspects. Instant noodles are precooked by steaming and then deep-fried or air-dried to make them shelf-stable. They are ready to eat within minutes when boiled in water or microwaved.

Yippee **Maggi**

Nutritional Information	Per 100g	Per Serve 30g	%RDA Per Seve
Energy (kcal)	459	138	6.9
Carbohydrate (g)	62.6	18.8	-
Total Sugar (g)	3.0	0.9	-
Added Sugar (g)	1.6	0.5	1.0
Total Fat (g)	20.1	6.0	9.0
Trans fat (g)	0.1	0.03	1.5
Saturated fat (g)	10.7	3.2	14.6
Sodium (mg)	1247.1	374.1	18.7
			% #RDA Per 100g
Protein (g)	9.0	2.7	15.0
*Calcium (mg)	128.5	38.6	21.4
#Iron (mg)	2.6	0.8	15.3
^Vitamin C (mg)	6.0	1.8	15.0
Vitamin B9 (mcg)	17.7	5.3	15.0

If a serve is 70 g

Nutrition Information*	Per 100g	Per Serve	%GDA^ Per Serve
Energy (kcal)	384	269	13%
Protein (g)	8.2	5.7	11%
Carbohydrate (g)	59.6	41.7	16%
-Total Sugars (g)	1.8	1.3	1%
-Added Sugars (g)	1.3	0.9	-
Total Fat (g)	12.5	8.8	13%
-Saturated Fat (g) (not more than)	8.2	5.7	29%
-Trans Fat (g) (not more than)	0.13	0.09	-
Sodium (mg)	1028.3	719.8	30%
			%RDA^ Per Serve
^Iron (mg)	6.90	4.83	16%

Maggi got banned in 2015 due to mis-labelling of MSG (mono sodium glutamate), a flavouring agent known to cause serious health issues when used more than prescribed amounts. Maggi is known for mis-labelling products and hence , I assume maggi's tastemaker contains some amounts of MSG.

Fats/Lipids : Yippee is denser in calories and fat, especially saturated fat.

Carbohydrates: Yippee has slightly higher sugar content, while Maggi has more carbs per serving.

Sodium: Both are high in sodium, but Maggi's larger serving size makes it higher per serving.

Micronutrients: Yippee provides more variety, but Maggi is richer in iron.

Both options are high in sodium and fats, typical of instant noodles, and should be consumed in moderation. Anyhow both comes under junk food category, but relatively yippee is better, despite it's high saturated fats(unhealthy) with more micronutrients and ensures absence of MSG in tastemaker.

NON-EDIBLE PRODUCTS

Now, let us discuss some non-edible products

1.MOISTURISING LOTION

Nivea **Vaseline**

Ingredients used: Nivea has cocoa butter and coconut oil while Vaseline has oat extract in them

Vitamin present: Nivea has Vitamin E and Vaseline does not.

Occlusive Agents: Vaseline uses petrolatum as its mainstay barrier to moisture, while Nivea depends more upon fatty alcohols and oils.

Fragrance additives: Both contain fragrance chemicals, but the composition will differ.

Both products are rich in lipids, serving as excellent moisturizers. Nivea includes more natural oils and Vitamin E, which can provide added nourishment. Vaseline relies on mineral oil and petrolatum for intensive moisture-locking properties.

2.Facewash

Derma Co. **Himalaya**

Target Concerns:

Derma Co.: Battles with active ingredients like salicylic acid and niacinamide towards acne control.

Himalaya: Targets detox of pollution with charcoal and green tea, rich in antioxidants.

Active Ingredients:

Derma Co.: Niacinamide and salicylic acid to help treat acne.

Himalaya: Activated Charcoal combined with Camellia Sinensis extract; specifically formulated for detox and antioxidant purposes.

Formulation:

Both parabens-free, while Derma Co. also promises to be sulfate-free and mineral oil-free.

Himalaya includes fragrance, while Derma Co. is devoid of dyes and adopts a more clinical approach.

Skin Type Suitability:

Derma Co.: Suitable for acne-prone and oily skin.

Himalaya: For a user who is exposed to pollution or for those looking for a daily detox.

Conclusion:

Derma Co. is more suitable for people with active acne and clogged pores and oily skin, while Himalaya is more like a fragrance based pollution detox facewash which can be used just to clean any dust and pollutants on the skin

3.Deodorant

Deodorants contain aluminum and zinc salts, and fragrance to mask the smell of perspiration. Most conventional antiperspirants rely on aluminum compounds, like aluminum trichlorohydrex gly, which plug the sweat ducts, and stop sweat coming to the skin's surface.

Laboratoire Naturel **Fogg**

Fogg is a less complex formulation it includes an antibacterial agent, Triclosan, that can therefore help suppress odor-causing bacteria. However, the addition of Diethyl Phthalate may raise questions among those who question phthalates in personal care products.

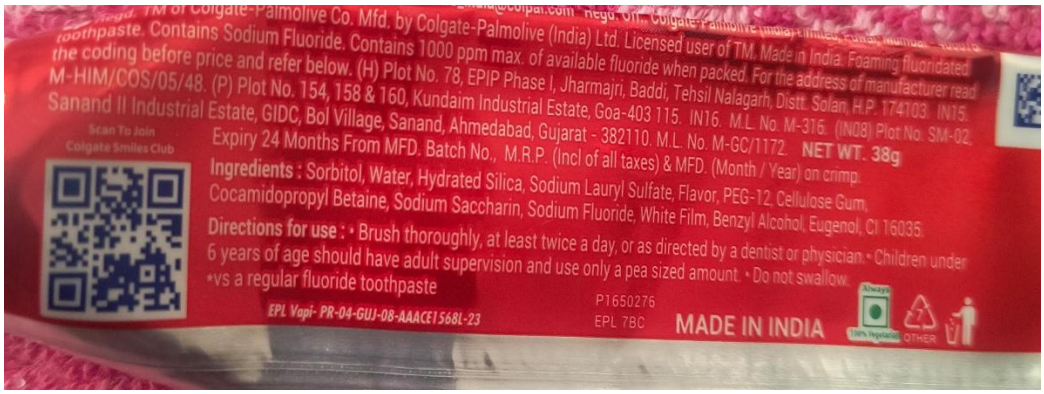
Laboratoire Naturel relies more on a mix of fragrance chemicals to be more intense but is not possibly as effective in controlling the bacterial smell compared to Fogg. Moreover, multiple fragrance chemicals raise the risk of irritation for people sensitive to the skin.

If you want a long-lasting fragrance odor with not much complexity, then Fogg would be better. If you like a more complex fragrance and aren't sensitive to ingredients, Laboratoire Naturel would be a better choice for you. Always do a patch test when trying a new product for the first time!

4.Toothpaste

Mostly, they contain sodium benzoate, methylparaben and ethylparaben. One or more agents are usually added to toothpastes and mouthwashes. Most toothpastes today contain fluorides to prevent caries.

Colgate



Close-up

Both Closeup and Colgate rely on the same basic ingredients such as fluoride to strengthen enamel and prevent cavities and abrasives such as silica or calcium carbonate that remove stains, cleanse, and clean the teeth more effectively. They share the same common ingredients like sodium lauryl sulphate for foaming and humectants like sorbitol and glycerine to maintain the moistening of the paste.

Thus, the central focus varies: For Closeup, freshness would be the central idea, accomplished through ingredients that contain menthol and flavouring agents, which bring about a cooling effect and linger long enough to protect breath. Some versions could also comprise antibacterial agents.

Colgate tends to centre its main features on general mouth health. Apart from the fluoride, it contains advanced antibacterial agents, such as zinc or other specific agents intended to improve gum health, desensitize teeth, or whiten them.

Close-up is thus more concerned with offering a new, bold feeling as opposed to Colgate that is tailored towards more general oral health needs with options for particularly specific dental concerns. Use Close-up for fresh breath; use Colgate for comprehensive dental care.

Conclusion

The edible and non-edible products along with their biomolecules indicated the crucial importance of knowing what it contains and what's it used for, while giving us a better view of everyday life. Biomolecules consist of carbohydrates, proteins, fats, and vitamins in edible products that directly affect our health through energy production, growth, and maintenance of bodily functions. On the other side, non-edible products such as toothpaste or cosmetics contain chemical compounds that affect functionality and safety.

This would mean knowledge of nutritional values and ingredients through product labels is the need. For food products, one would have healthier dietary choices without allergens, balanced nutrition, and so on. For non-food items, this would give safer usage, avoid exposure to harmful substances, and more environmentally responsible behavior.

With this in mind, knowledge and sensitization about product biomolecules and their implications provide information that allows individuals to make the most informed choices to improve well-being, safety, and sustainability in consumption and lifestyle.

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